

First records of *Opetiopalpus sabulosus* Motschulsky, 1840 (Coleoptera, Cleridae) for the European Alps

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Abstract

The genus *Opetiopalpus* from the family of checkered beetles (Coleoptera: Cleridae) is represented by 28 species worldwide, with 11 species found in the Palearctic and only four sparsely in Europe prior to 1998. One species, *Opetiopalpus sabulosus* Motschulsky, 1840, was recently found in Eastern Europe (i.e. Ukraine, Bulgaria, and Moldavia), with the most recent record in 2015 in Eastern Romania; no data are available for Central Europe. During a comprehensive sampling survey in 2016 in the dry inner-Alpine Vinschgau Valley (South Tyrol, Italy), one individual of *O. sabulosus* was recorded from soil core samples on an extensively managed steppe-like dry pasture at 2000 m a.s.l. This was the first record of *O. sabulosus* for the European Alps and Central Europe. Further intensive samplings were conducted in 2017 and 2018, in which one additional specimen at a dry pasture at 2500 m confirms the presence of this checkered beetle. *Opetiopalpus sabulosus* seems to have a cryptic lifestyle and therefore a low detection probability. The locations from where the species was recorded, all steppe-like dry grasslands that are part of the LTSER area “Val Mazia/Matschertal” within the LTER-Italia network, are characterized by low precipitation (730 mm at 2000 m a.s.l.) and traditional low input management (grazing cattle, sheep, and horses). Beside *O. sabulosus*, other rare and new species for South Tyrol and Italy were found at the sampling area. Therefore, our records underline the high biodiversity and the high nature conservational value of these steppe-like dry grasslands and the importance of long-term research to monitor such species.

Keywords

new report, checkered beetles, Alpine grassland, dry pasture, LTER_EU_IT_097, LTER-Italia

1. Introduction

Cleridae are characterized as colorful, hairy beetles that are either predacious (especially on wood-boring or carrion-visiting insects) or flower visitors (Gerstmeier 2014). In the Palearctic, 215 Cleridae species (common name: checkered beetles) have been described to date (Gerstmeier 2014), of which the genus *Opetiopalpus* (subfamily Korynetinae) is represented by 11 species (28 worldwide); only four species have been sparsely found in Europe prior to 1998 (Gerstmeier 1998). A fifth species of the genus *Opetiopalpus*, *O. sabulosus* Motschulsky, 1840, was recently recorded from the peripheral regions of Europe. In general, *O. sabulosus* was recorded from North Africa, Armenia, Western Asia, Mongolia, and Siberia (Gerstmeier 1998) as well as from Eastern Europe (Ukraine, Bulgaria, and Moldavia; Löbl and Smetana 2007). To our knowledge, the most recent record, comprising six individuals, was from Eastern Romania (Kurzeluk 2015). However, as far as we are aware, there are no previous records for Central Europe for this species.

2. Material and methods**Site description**

A comprehensive biodiversity study was conducted in 2016 at the “Muntatschinig” site in the Alpine Long-Term Socio-Economic Research (LTSER) platform “Val Mazia/Matschertal”, a member of the national and international long-term ecological research networks LTER-Italy, LTER Europe, and ILTER (Vinschgau Valley, South Tyrol, Italy; site code LTER_EU_IT_097; 46°41.647'N; 10°37.029'E). For more details see Rief et al. (2017) and Hilpold et al. (2018). The “Muntatschinig” site ranges in elevation from approx. 1000 to 2500 m a.s.l. with slopes exposed to the south and south-west (Fig. 1).

Study design

Three soil core samples each (20 × 20 cm, 15 cm deep if possible) were taken randomly and evenly distributed at the extensively managed dry pastures P2000 (mean soil parameters: pH 4.47 ± 0.13 , SOM 14.66 ± 2.27 , C:N ratio 13.40 ± 0.98) and P2500 (pH 4.30 ± 0.30 , SOM 15.99 ± 3.08 , C:N ratio 12.81 ± 1.22) at four dates from April to October 2016 (Table 1; for details see Steinwandter and Seeber 2017). The

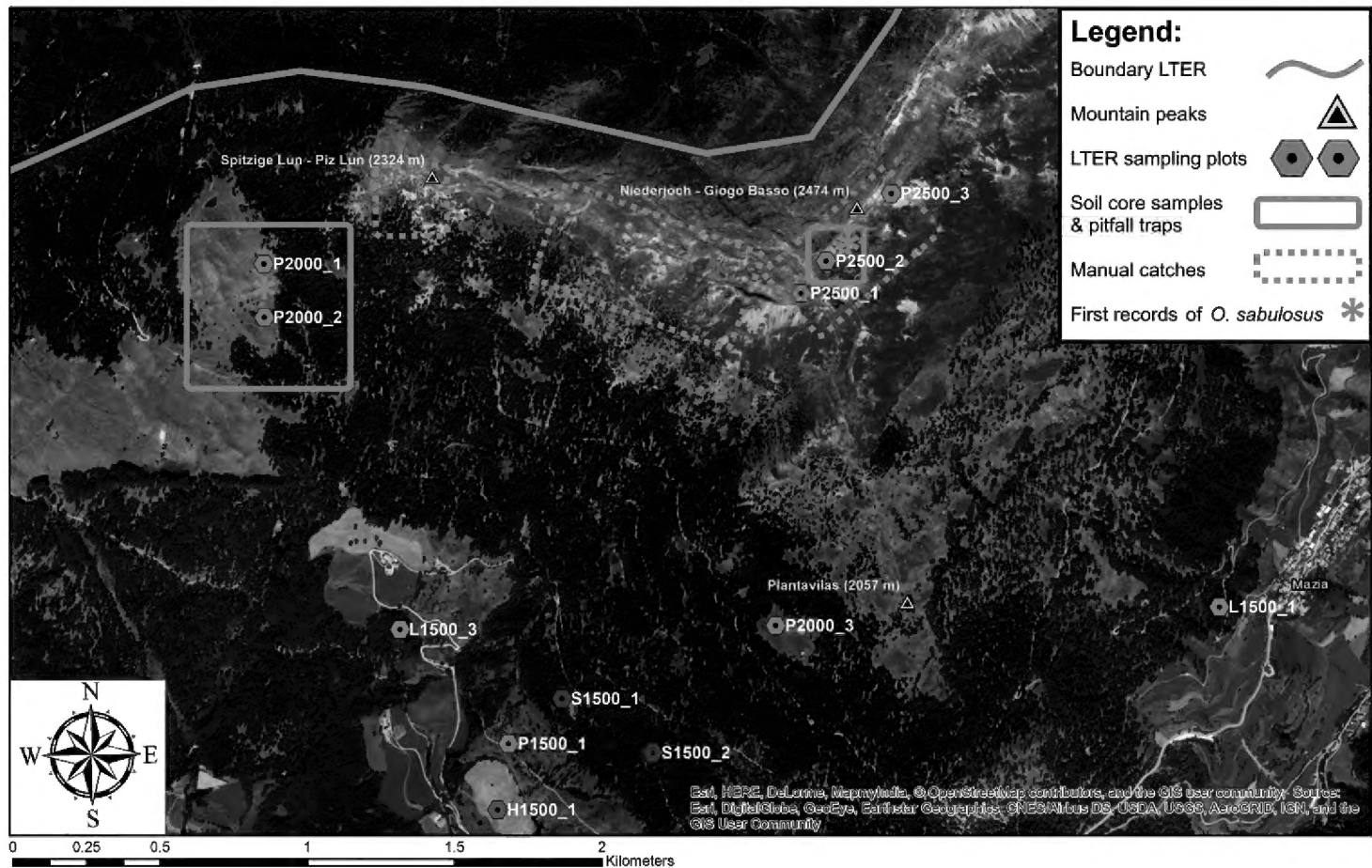


Figure 1. Aerial photograph of the upper “Muntatschinig” site in the LTSEr area “Val Mazia/Matschertal” with the samplings from 2016 to 2018. The orange frames depict the *Opetiopalpus sabulosus* Motschulsky, 1840 (Coleoptera: Cleridae) sampling areas, hexagons the locations of permanent monitoring sites (e.g. L1500: Larch forests at 1500 m a.s.l., H1500: hay meadows, S1500: Spruce forests, P2000: dry pastures at 2000 m, etc.).

Table 1. List of samplings and methods at the “Muntatschinig” site in the LTSEr area “Val Mazia/Matschertal” to find *Opetiopalpus sabulosus* Motschulsky, 1840 (Coleoptera: Cleridae). The sampling areas include steppe-like dry pastures at different elevations (e.g. P2000_1 represents plot number one of dry pastures P at approximately 2000 m a.s.l.) as well as summit areas. Details for each sampling date are given.

Date	Method	Sampling plots	Details
04.05.2016	soil cores	P2000_1-3, P2500_1-3	3 per plot
26.06.2016	pitfall traps	P2000_1-3, P2500_2	2 per plot, active for 14 days
30.06.2016	soil cores	P2000_1-3, P2500_1-3	3 per plot
31.08.2016	soil cores	P2000_1-3, P2500_1-3	3 per plot
31.10.2016	soil cores	P2000_1-3, P2500_1-3	3 per plot
25.05.2017	manual catches	P2000_1-2, P2500_2-3, Niederjoch, Spitzige Lun	hand-sampling, exhaustor, sieving litter and lichens
21.05.2018	soil cores	P2500_2	3 per plot
19.06.2018	pitfall traps	P2500_2	3 per plot, active for 35 days
19.06.2018	soil cores	P2000_1-2	3 per plot
16.07.2018	pitfall traps	P2000_1-2	3 per plot, active for 27 days
16.07.2018	soil cores	P2000_1-2	3 per plot
06.08.2018	pitfall traps	P2000_1-2	3 per plot, active for 21 days
06.08.2018	soil cores	P2000_1-2	3 per plot
03.09.2018	pitfall traps	P2000_1-2	3 per plot, active for 28 days

samples were heat-extracted for 12 days in a modified Kempson apparatus (Kempson et al. 1963) in the laboratory of the Institute for Alpine Environment of Eurac Research, Bozen/Bolzano, Italy. All soil macro-invertebrates were stored in 75% ethanol solution until identification to family, and where possible, to species level, under a stereo microscope (Leica M205 C).

In late April 2017, the whole area around P2000_1, P2500_2, the “Spitzige Lun/Piz Lun” peak (2324 m), and the crest that ends in the “Niederjoch/Giogo Basso” peak (2474 m) was thoroughly investigated by hand collecting and litter sieving the shrub, grass, and lichen layers (Fig. 1). Furthermore, intensive sampling was undertaken in summer 2018 by taking randomly and evenly distributed three soil core samples and installing each three pitfall traps with propylene glycol as preservation fluid on each the P2000_1, P2000_2, and P2500_2 plots. They were emptied at the successive sampling date (2018 sampling, three to five weeks); in 2016 after two weeks in the field (Table 1).

Results and discussion

Two individuals of *O. sabulosus* Motschulsky, 1840 (Coleoptera: Cleridae) were found during all sampling attempts (Table 1). The sites (P2000_1 and P2500_2) are steppe-like dry pastures extensively grazed by cattle and sheep at 2000 m and 2500 m a.s.l., respectively. The whole area is exposed to the south (i.e. SSW to SSE) and has a mean inclination of 10° (Fig. 2). Small herds (20–30 individuals) of cattle were grazing on the sites from June to October; at the “Niederjoch/Giogo Basso” peak also sheep were present. The P2000_1 dry pasture is surrounded in the north and east by a mixed Norway Spruce [*Picea abies* (L.) H. Karst.] and Swiss Stone Pine [*Pinus cembra* L.] forest (Fig. 2A). Small stones are dispersed over large parts of the area; in the northwest a small artificial reservoir can be found. The site is located close to a steep silicate rocky slope from the “Spitzige Lun/Piz Lun” peak (2324 m). The P2500_2 dry pasture is located close to the “Niederjoch/Giogo Basso” peak (2474 m) with stony and sandy areas at the foot of the small rocky peak (Fig. 2B).

The first specimen was extracted from one P2000_1 soil core sample taken on 31st August 2016 (1 male, leg. Steinwandter M, det. Kahlen M, 46°42.184'N; 10°34.203'E, Table 1). The specimen was 3 mm in size and had no physical damage (Fig. 3). The identification of the species followed Gerstmeier (1998) and was confirmed by both Manfred Kahlen, a Coleoptera specialist for the Central Alps (Kahlen 2018), and Roland Gerstmeier, a Cleridae specialist. The individual is stored in the Coleoptera collection of Manfred Kahlen at the “Tiroler Landesmuseen Betriebs G.m.b.H., Naturwissenschaftliche Sammlungen, Sammlungs- und Forschungszentrum in Hall in Tirol”, Tyrol, Austria.

A second specimen was found two years after the first record, in a pitfall trap from the 2018 sampling collected on 19th June 2018 at the P2500_2 site (1 adult, leg. & det. Steinwandter M, 46°42.168'N; 10°35.700'E, Table 1). It is stored in the collection of the Museum of Nature South Tyrol, Bozen/Bolzano, Italy (Nr. INS 4709). Our investigations suggest that these are the first confirmed records of *O. sabulosus* for the European Alps and Central Europe.

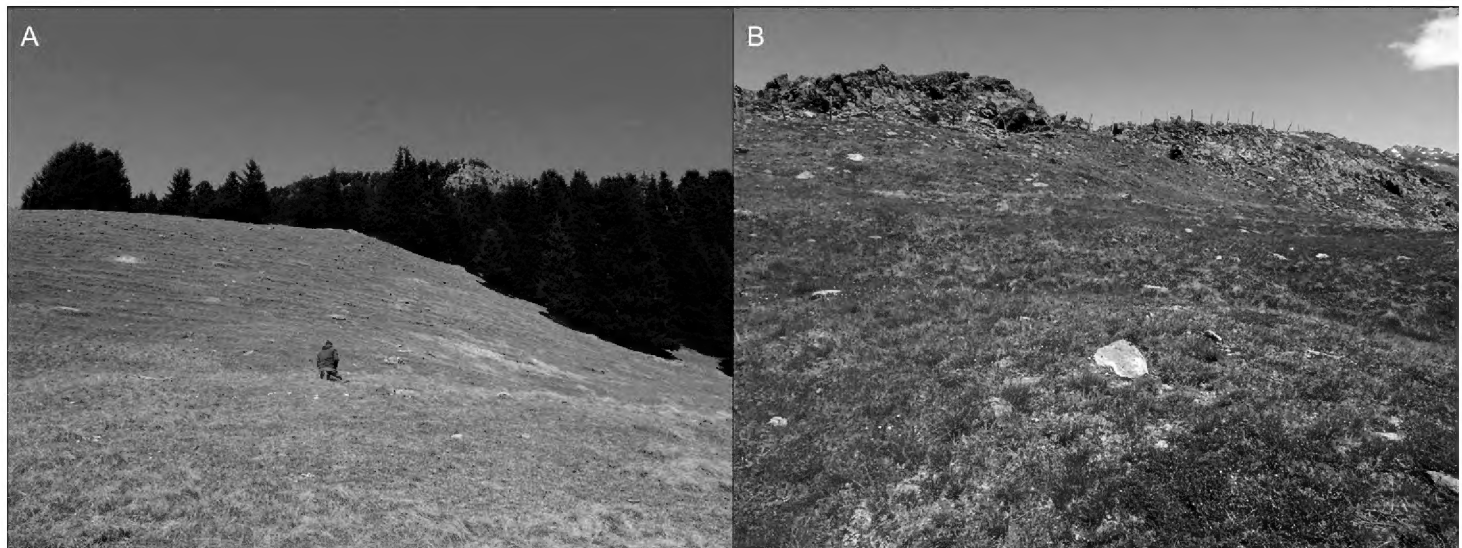


Figure 2. Photographs of the steppe-like dry pastures at the “Muntatschinig” site where *Opetiopalpus sabulosus* Motschulsky, 1840 was first recorded. The sites are part of the LTSER area “Val Mazia/Matscher-tal” at the research site “Muntatschinig” **A** P2000_1: photograph 2A was taken on 4th May 2016. In the background the “Spitzige Lun/Piz Lun” peak can be seen **B** P2500_2: photograph 2B was taken on 19th June 2018. The rocky “Niederjoch/Giogo Basso” peak can be seen in the left upper corner.



Figure 3. Habitus of the first record of *Opetiopalpus sabulosus* Motschulsky, 1840. Multiple photographs were taken using a stereo microscope (Olympus ZX 10) and a camera (Panasonic Lumix GH4), and rendered with a focus stacking software (Helicon Focus version 6.0) by Andreas Eckelt. The specimen is stored in the collection of Manfred Kahlen at the “Tiroler Landesmuseen Betriebs G.m.b.H., Naturwissenschaftliche Sammlungen, Sammlungs- und Forschungszentrum in Hall in Tirol”, Tyrol, Austria.

The records on our P2000_1 and P2500_2 sites could indicate a small and cryptically living population adapted to inner-Alpine and steppe-like dry grasslands as well as rocky alpine landscapes. The fact that the specimens were found after two years underlines the presence of a small population of *O. sabulosus* in the LTSER area “Val Mazia/

Matschertal” and excludes a serendipitous finding. The Vinschgau Valley represents one of the driest regions of the whole European Alps and the only dry valley of the Eastern Alps (Braun-Blanquet 1961), with a mean annual precipitation of only 525 mm at the valley bottom, 730 mm at P2000_3; the mean annual temperature is 4.12 °C (Della Chiesa et al. 2014). All other recent findings of this checkered beetle were found in habitats that span from the lowland to the higher mountains up to 3200 m of the Northern Caucasus (Berlov and Berlov 2007), with preferences for dry grassland. Additionally, stony ground seems to be favorable, preferably providing insect cadavers as food source (Gerstmeier 1998).

We will continue to survey these steppe-like grassland areas in the inner-Alpine dry Vinschgau Valley to monitor the population and to gather more information about distribution, ecology and faunistics of *O. sabulosus*. The LTSER area “Val Mazia/Matschertal has already yielded several findings of new arthropod species for South Tyrol and Italy (e.g. Ballini et al. 2017 for Araneae, Arachnida; Schatz and Zanetti 2017 for Staphylinidae, Coleoptera), and provides the necessary means for biodiversity studies due to long-term sampling approaches.

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